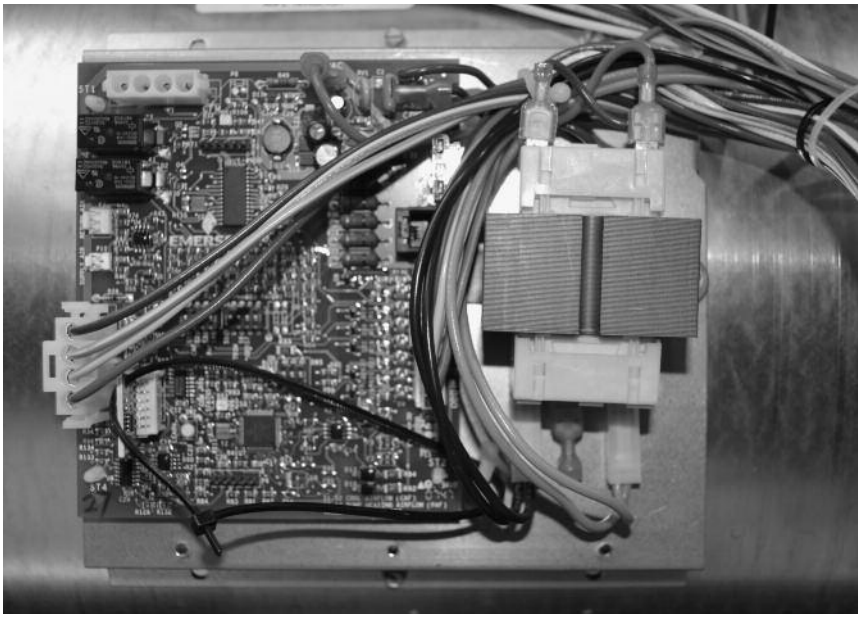
5.0 AIR HANDLER *Comfort Control² System™* INTERFACE BOARD

FIGURE 8
THE AIR HANDLER CONTROL BOARD EQUIPPED WITH THE *Comfort Control² System™*



The RHPL-series of air handlers are designed to operate with conventional 24VAC controls or with a serial communicating system.

For the *Comfort Control² System™*, you must have:

- An air handler equipped with the *Comfort Control² System™*
- A condensing unit or heat pump equipped with *Comfort Control² System™*
- A *Comfort Control²* thermostat

If your equipment does not meet this criteria, you must wire it using conventional 24VAC thermostat control wiring. Reference Section 5.11.

5.1 *Comfort Control²* CONTROL WIRING

The *Comfort Control²* requires four (4) control wires for unit operation:

R – 24VAC
C – 24VAC common
1 – Data wire 1
2 – Data wire 2

Wiring sizing for *Comfort Control²* is identical to systems using low voltage 24V wires.

Note: *Comfort Control²* requires a minimum 18 AWG.

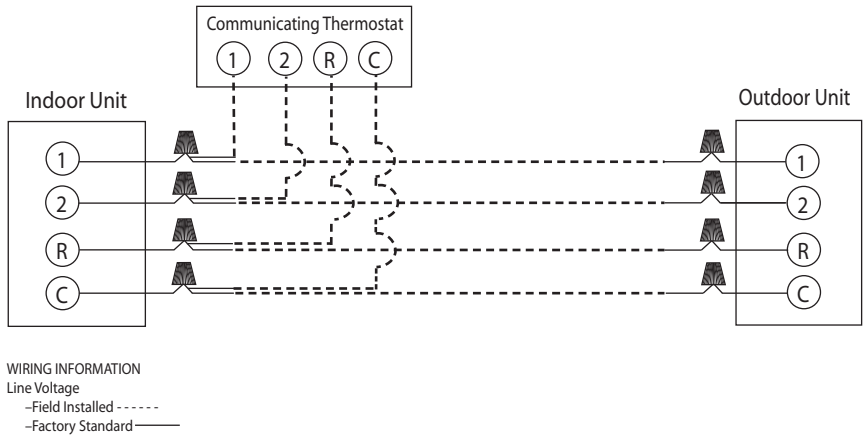
IMPORTANT: When using *Comfort Control²*, do not make any connections to the 24VAC thermostat wires. If any connections are made to the G, W1, W2, Y1, Y2, B, or ODD wires, the *Comfort Control²* control will assume the control is being used with a traditional thermostat and will IGNORE ANY COMMUNICATIONS USING DATA WIRE 1 AND DATA WIRE 2.

IMPORTANT: Class 2 low voltage control wire should not be run in conduit with power wiring and must be separated from power wiring, unless Class 1 wire of proper voltage rating is used.

- The four 18AWG low voltage control wires must be installed from the thermostat to the indoor unit and from indoor unit to the outdoor unit. The wire length between the thermostat and indoor unit should not be greater than 100 feet. The wire length between the indoor unit and outdoor unit should not be greater than 125 feet.
- Low voltage control connections are made by extending wires from top of air handler using wire nuts.
- See wiring diagrams attached to indoor and outdoor sections to be connected.

- Do not leave excess field control wiring inside unit, pull excess control wire to outside of unit and provide strain relief for field wiring on inside of cabinet at point wiring penetrates cabinet.
- Make sure, after installation, separation of control wiring and power wiring has been maintained.

FIGURE 9
TYPICAL *The Comfort Control² System™* WIRING DIAGRAM



5.2 *Comfort Control² System™* CONTROL BOARD

The RHPL series air handler control, Figure 8, has the following features:

- Memory Card – The memory card stores all information needed for unit operation. Once the system is wired for serial communications, this information is *shared* with the thermostat and outdoor unit. This *shared* data is available if one of the components in the system needs to be replaced.
- An automotive-style ATC blade fuse for transformer protection (3 amp).
- An on-board LED to indicate blower CFM.
- An RJ-11 port for use with a diagnostic tool.
- Inputs for field installed supply and return air temperature sensors (available in kit RXHT-A01)
- DIP switches for airflow adjustments

IMPORTANT: The DIP switches are NOT used when the air handler is wired for serial communications. Airflow adjustments are performed via the thermostat or a diagnostic tool.

Installation Verification

- Term and bias dip switches should be on.
- 24V AC power on R&C must be present at the control for the air handler to operate, reference Figure 9.
- Line voltage must be present at the control for indoor blower operation.
- The RX Data LED will flash green in normal operation. A flashing green light indicates 24VAC is present and the data wires 1 and 2 are wired properly.

IMPORTANT: If the RX DATA LED is solid green, data wire 1 and data wire 2 are not properly connected. Typically, the connections are switched, i.e. data wire 1 is wired to the data wire 2 connection and data wire 2 is wired to the data wire 1 connection. Verify wiring and correct the polarity at the two data wires.

IMPORTANT: Diagnostic port is for the diagnostic tool only. Do not attempt to connect components using a telephone cord. Damage will occur.

IMPORTANT: Diagnostic port is not a phone jack. Connecting to a telephone or telephone system will result in damage.

5.3 USING THE ON-BOARD LED TO DETERMINE BLOWER CFM

The CFM LED indicates blower output by flashing one (1) flash for every 100 CFM of airflow. The LED will pause 1/10 second between each flash.

5.4 AIRFLOW ADJUSTMENTS WITH THE *Comfort Control² System™*

The RHPL air handler *Comfort Control² System™* may operate using the *Comfort Control²* or via traditional thermostat wiring. When the air handler is wired for the *Comfort Control²* using Data wire 1 and Data wire 2, the DIP switches on the *Comfort Control²* control have NO affect on the airflow.

IMPORTANT: When using the *Comfort Control²*, the DIP switches have no affect on airflow or on air handler performance.

5.5 COOLING AIRFLOW SETTINGS (BY TONNAGE)

The RHPL-series of air handlers automatically set cooling airflow when using the *Comfort Control² System™*. The air handler detects the tonnage of the condensing unit/heat pump and sets airflow for optimum performance and comfort. Refer to Table 2 for the airflow provided when the RHPL air handler is matched to the (-)PRL heat pump.

TABLE 1
RHPL AIRFLOW WHEN MATCHED TO THE (-)PRL HEAT PUMP

Tonnage of heat pump	Airflow (cfm)	
	2nd Stage	1st Stage
(-)PRL-024JEC	775	625
(-)PRL-036JEC	1200	875
(-)PRL-048JEC	1625	1200
(-)PRL-060JEC	1675	1375

5.6 COOLING AIRFLOW ADJUSTMENT

The *Comfort Control² System™* control board does allow the installer to tweak the cooling airflow +/-10% to suit the installation. When using the *Comfort Control² System™*, the airflow can only be adjusted using the serial communicating thermostat or a service tool. To adjust the airflow, go to the airflow adjustment menu and select the desired adjustment. (Reference Table 2.)

TABLE 2
AIRFLOW ADJUSTMENT SELECTION TABLE

Selection
None
+10%
-10%

IMPORTANT: Cooling airflow adjustment is accessible via the *Comfort Control²* thermostat or via a service tool. Refer to their instructions to access the cooling airflow adjustment menu.

NOTE: Cooling airflow adjustments are in effect for cooling operation only. They are ignored when in heating mode or when electric heat is activated.

5.7 HEATING AIRFLOW ADJUSTMENT

The *Comfort Control²* control does allow the installer to tweak the heating airflow +/-10% to suit the installation. When using *Comfort Control² System™*, the airflow can only be adjusted using the *Comfort Control²* thermostat or a service tool. To adjust the airflow, go to the airflow adjustment menu and select the desired adjustment. (Reference Table 3.)

TABLE 3
AIRFLOW ADJUSTMENT SELECTION TABLE

Selection
None
+10%
-10%

IMPORTANT: Heating airflow adjustment is accessible via the *Comfort Control²* thermostat or via a service tool. Refer to their instructions to access the heating airflow adjustment menu.

NOTE: Heating airflow adjustments are in effect for heat pump operation only. They are ignored when in cooling mode or when electric heat is activated.

5.8 ELECTRIC HEAT AIRFLOW

The RHPL-series of air handlers are factory programmed to provide adequate airflow for electric heat (auxiliary heat). Airflow for electric heat is fixed and cannot be field adjusted.

TABLE 4
ELECTRIC HEAT AIRFLOW

Thermostat Input	Electric Heat Airflow			
	2-ton	3-ton	4-ton	5-ton
W1 or W2	800 CFM	1200 CFM	1600 CFM	1800 CFM

5.9 COOLING MODE DEHUMIDIFICATION

The serial communicating control is shipped with "On Demand Dehumidification" (ODD) turned OFF. On Demand Dehumidification may be activated from the serial communicating thermostat when the serial communicating thermostat has an on-board humidity sensor.

IMPORTANT: On Demand Dehumidification is accessible via the serial communicating thermostat or via a service tool. Refer to their instructions to access the ODD airflow adjustment menu.

TABLE 5
ODD TERMINAL

INDOOR AMBIENT CONDITION	INPUT TO "ODD" TERMINAL (FROM HUMIDISTAT)
HIGH HUMIDITY	Ø VAC
LOW HUMIDITY	24 VAC

5.10 COOLING DELAY PROFILES

The RHPL air handler is factory configured with optimum ON/OFF delays to maximize energy efficiency and comfort. In certain situations, the installer may choose an alternate profile to tweak the system operation for the building load and to maximize comfort. The alternate profiles are defined below:

IMPORTANT: On Demand Dehumidification, ODD, is the preferred method to maximize comfort with little or no loss of energy efficiency. If using ODD, do NOT use any of the alternate profiles. Only use the factory default profile. Use of the alternate profiles with ODD will decrease energy efficiency with no gain in comfort.

Profile A – Factory default profile.

	On Delay		
Air Handler	Delay Duration (second)	% Rated Airflow	Off Delay (seconds)
RHPL-HM2421	No Delay	N/A	45
RHPL-HM3621	No Delay	N/A	45
RHPL-HM4824	No Delay	N/A	45
RHPL-HM6024	No Delay	N/A	45

Profile B – Quiet Start profile

The Quiet Start profile is configured to bring the blower up to 50% airflow for 30 seconds before advancing to 100% airflow. This helps to minimize the blower noise at system startup.

	On Delay		
Air Handler	Delay Duration (second)	% Rated Airflow	Off Delay (seconds)
RHPL-HM2421	30	50	15
RHPL-HM3621	30	50	15
RHPL-HM4824	30	50	15
RHPL-HM6024	30	50	15

Profile C – Humid profile

The humid profile is configured to run the blower at 80% airflow for about the first four minutes of system operation to remove more moisture from the conditioned space.

	On Delay		
Air Handler	Delay Duration (second)	% Rated Airflow	Off Delay (seconds)
RHPL-HM2421	255	80	0
RHPL-HM3621	255	80	0
RHPL-HM4824	255	80	0
RHPL-HM6024	255	80	0

Profile D – Dry Climate profile

The Dry Climate profile is configured for areas that require little to no additional dehumidification.

	On Delay		
Air Handler	Delay Duration (second)	% Rated Airflow	Off Delay (seconds)
RHPL-HM2421	150	88	60
RHPL-HM3621	150	88	60
RHPL-HM4824	150	88	60
RHPL-HM6024	150	88	60

WIRE COLOR CODE			
BK – BLACK	G – GREEN	PR – PURPLE	Y – YELLOW
BR – BROWN	GY – GRAY	R – RED	
BL – BLUE	O – ORANGE	W – WHITE	

FIGURE 10
TYPICAL 2-STAGE THERMOSTAT: HEAT PUMP WITH ELECTRIC HEAT

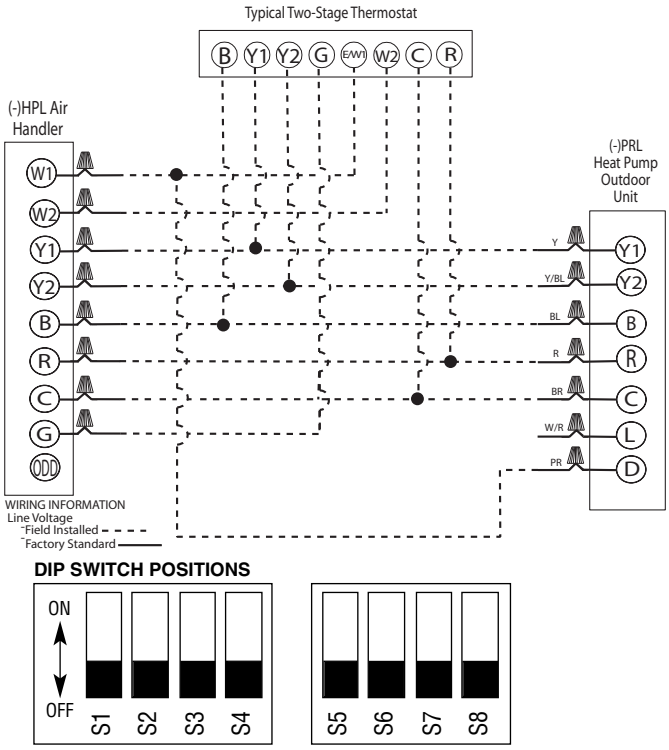
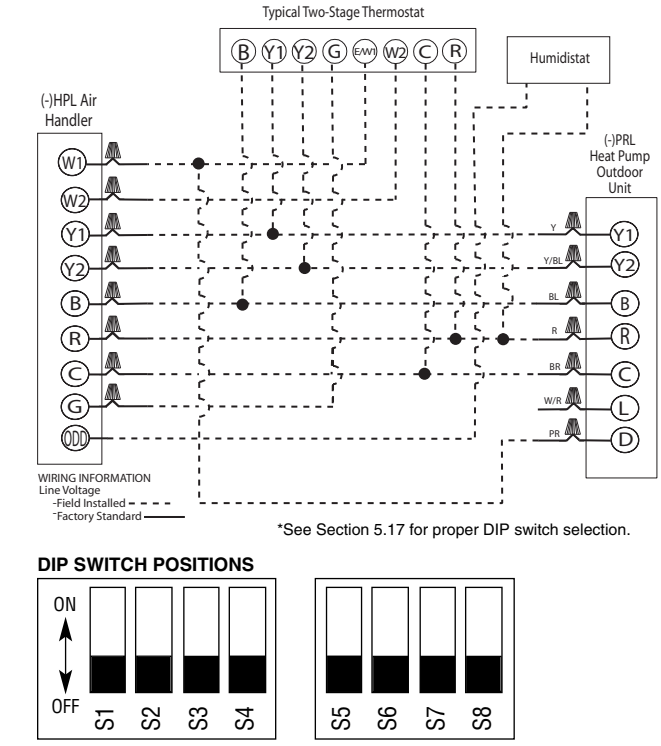
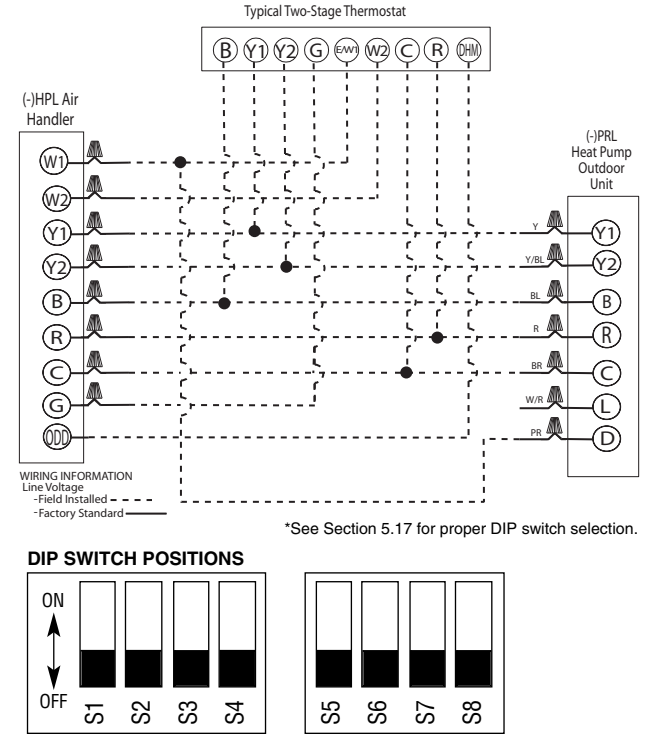

Typical Two-Stage Thermostat
B Y1 Y2 G E/W1 W2 C R
(-)HPL Air Handler
W1 W2 Y1 Y2 B R C G ODD
(-)PRL Heat Pump Outdoor Unit
Y Y/BL BL R BR W/R PR
Y1 Y2 B R C L D
WIRING INFORMATION
Line Voltage
-Field Installed
-Factory Standard
DIP SWITCH POSITIONS
ON
OFF
S1 S2 S3 S4 S5 S6 S7 S8

FIGURE 11
TYPICAL TWO-STAGE THERMOSTAT: (-)PRL HEAT PUMP WITH ELECTRIC HEAT USING A HUMIDISTAT FOR DEHUMIDIFICATION*.


Typical Two-Stage Thermostat
B Y1 Y2 G E/W1 W2 C R
Humidistat
(-)HPL Air Handler
W1 W2 Y1 Y2 B R C G ODD
(-)PRL Heat Pump Outdoor Unit
Y Y/BL BL R BR W/R PR
Y1 Y2 B R C L D
WIRING INFORMATION
Line Voltage
-Field Installed
-Factory Standard
DIP SWITCH POSITIONS
ON
OFF
S1 S2 S3 S4 S5 S6 S7 S8

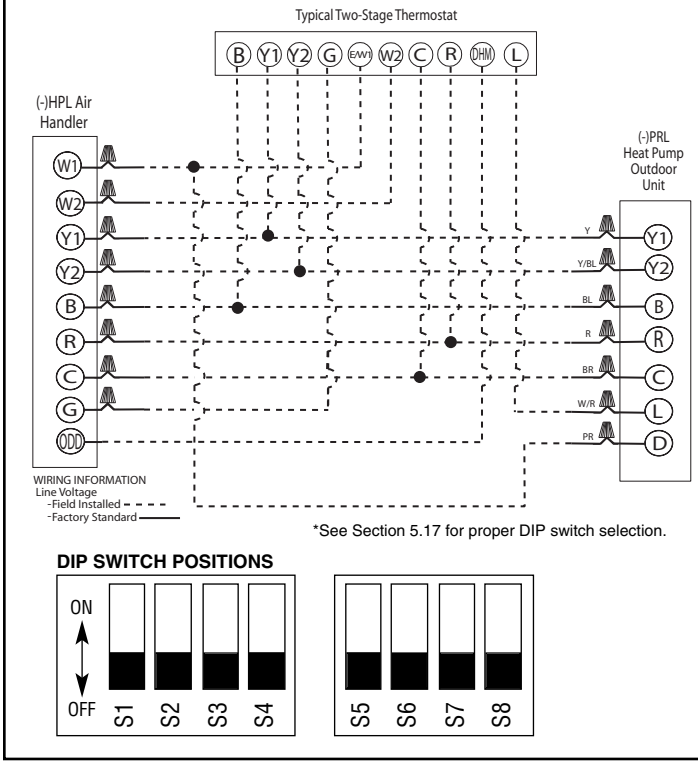
*See Section 5.17 for proper DIP switch selection.

FIGURE 12
TYPICAL TWO-STAGE THERMOSTAT: (-)PRL HEAT PUMP WITH ELECTRIC HEAT USING A TWO-STAGE THERMOSTAT WITH DEHUMIDIFICATION*


Typical Two-Stage Thermostat
B Y1 Y2 G E/W1 W2 C R DHM
(-)HPL Air Handler
W1 W2 Y1 Y2 B R C G ODD
(-)PRL Heat Pump Outdoor Unit
Y Y/BL BL R BR W/R PR
Y1 Y2 B R C L D
WIRING INFORMATION
Line Voltage
-Field Installed
-Factory Standard
DIP SWITCH POSITIONS
ON
OFF
S1 S2 S3 S4 S5 S6 S7 S8

*See Section 5.17 for proper DIP switch selection.

FIGURE 13
(-)PRL HEAT PUMP WITH ELECTRIC HEAT USING A TWO-STAGE THERMOSTAT WITH DEHUMIDIFICATION* AND A MALFUNCTION LIGHT


Typical Two-Stage Thermostat
B Y1 Y2 G E/W1 W2 C R DHM L
(-)HPL Air Handler
W1 W2 Y1 Y2 B R C G ODD
(-)PRL Heat Pump Outdoor Unit
Y Y/BL BL R BR W/R PR
Y1 Y2 B R C L D
WIRING INFORMATION
Line Voltage
-Field Installed
-Factory Standard
DIP SWITCH POSITIONS
ON
OFF
S1 S2 S3 S4 S5 S6 S7 S8

*See Section 5.17 for proper DIP switch selection.

5.11 CONVENTIONAL 24VAC THERMOSTAT CONTROL WIRING

The (-)PRL series of heat pumps allow the installer to use conventional 24VAC control wiring and a conventional thermostat for proper unit operation.

IMPORTANT: The preferred method of unit installation and operation is by the *Comfort Control² System™*, which allows access to the fault history of the system. This diagnostic information is not available when the (-)PRL unit is using a conventional thermostat. Reference section 5.1 *Comfort Control² System™* Control Wiring.

Thermostat control wiring requires a minimum of eight (8) wires for proper unit operation:

R – 24VAC
C – 24VAC common
G – Constant Fan
W1 – First stage electric heat
W2 – Second stage electric heat
Y1 – First stage operation
Y2 – Second stage operation
B – Heat pump operation

Optional wiring:

ODD – On demand humidification

NOTE: W1 and W2 may be jumpered together to energize all the electric heat when a call for electric heat is received.

NOTE: When using 24VAC thermostat control wiring, the serial communicating control will ignore any inputs to Data wire 1 and Data wire 2.

IMPORTANT: Class 2 low voltage control wire should not be run in conduit with power wiring and must be separated from power wiring, unless Class 1 wire of proper voltage rating is used.

Low voltage control wiring should be 18 AWG color-coded (105°C minimum). For lengths longer than 100 ft., 16 AWG wire should be used.

Low voltage control connections are made by extending wires from top of air handler using wire nuts.

See wiring diagrams attached to indoor and outdoor sections to be connected

Do not leave excess field control wiring inside unit, pull excess control wire to outside of unit and provide strain relief for field wiring on inside of cabinet at point wiring penetrates cabinet.

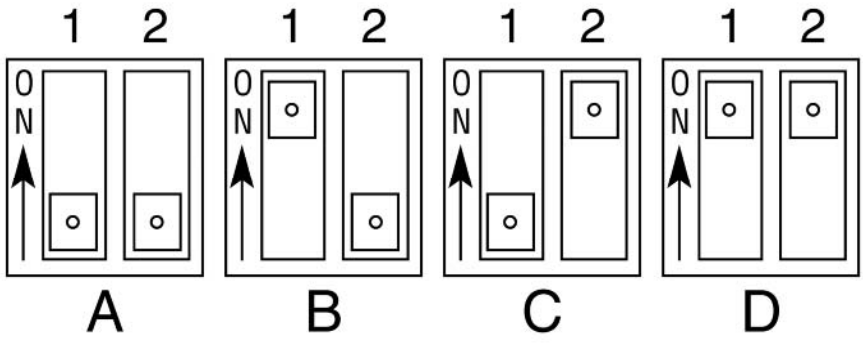
Make sure, after installation, separation of control wiring and power wiring has been maintained.

5.12 USING THE ON-BOARD LED TO DETERMINE BLOWER CFM

The CFM LED indicates blower output by flashing one (1) flash for every 100 CFM of airflow. The LED will pause 1/10 second between each flash.

5.13 COOLING AIRFLOW SETTINGS

FIGURE 14
DIP SWITCH SETTING FOR COOLING AIRFLOW



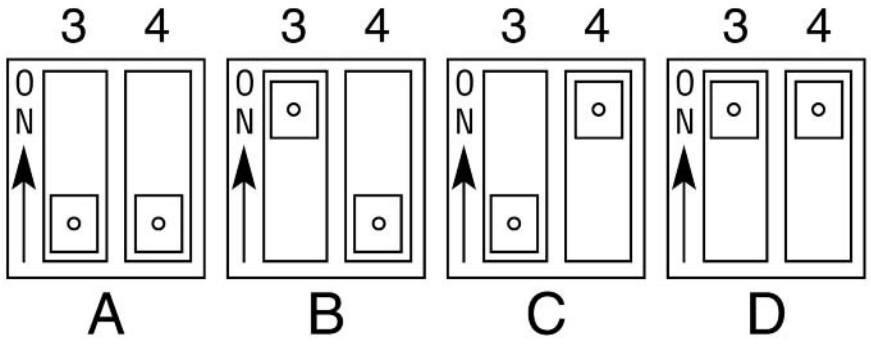
The RHPL-series of air handlers are factory configured to for proper airflow. The cooling airflow (CAF) is fixed and the DIP switch settings have no effect on airflow. The factory setting is:

TABLE 6
AIRFLOW SETTINGS WHEN USING TRADITIONAL 24VAC THERMOSTAT

	Cooling Airflow							
	2-ton		3-ton		4-ton		5-ton	
	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2
CFM	625	775	900	1200	1200	1625	1375	1675

IMPORTANT: The DIP switches are active only when using conventional a 24VAC thermostat. If using the *Comfort Control² System™*, refer to Section 5.13 for adjusting airflows.

FIGURE 15
DIP SWITCH SETTING FOR HEAT PUMP AIRFLOW



5.14 HEATING AIRFLOW ADJUSTMENT

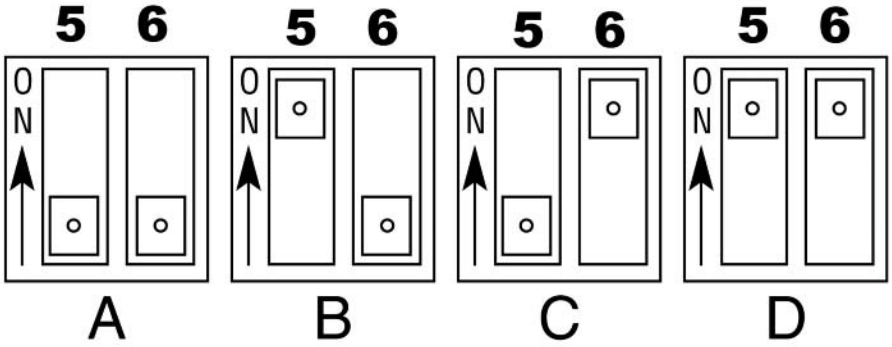
The RHPL-series of air handlers are factory configured to for proper airflow. The heat pump airflow (PAF) is fixed and the DIP switch settings have no effect on airflow. The factory setting is:

TABLE 7
AIRFLOW SETTINGS WHEN USING TRADITIONAL 24VAC THERMOSTAT

	Heating Airflow							
	2-ton		3-ton		4-ton		5-ton	
	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2
CFM	625	775	900	1200	1200	1625	1375	1675

IMPORTANT: The DIP switches are active only when using conventional a 24VAC thermostat. If using the *Comfort Control² System™*, refer to Section 5.14 for adjusting airflows.

FIGURE 16
DIP SWITCH SETTING FOR AIRFLOW ADJUSTMENTS



5.15 AIRFLOW ADJUSTMENT (TRIM)

Cooling and heat pump airflow can be adjusted +/-10% to suit the installation. To adjust the airflow, set DIP switches 5 & 6 per Table 8:

TABLE 8
AIRFLOW ADJUSTMENT SELECTION TABLE

DIP Switch Settings			Airflow Adjustments							
			2-ton		3-ton		4-ton		5-ton	
Position	Switch 5	Switch 6	Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2
A	OFF	OFF	625	775	900	1200	1200	1625	1375	1675
B	ON	OFF	700	850	1000	1325	1325	1800	1525	1850
C	OFF	ON	575	700	800	1075	1075	1475	1250	1500
D	ON	ON	625	775	900	1200	1200	1625	1375	1675

IMPORTANT: The DIP switches are active only when using conventional a 24VAC thermostat. If using the *Comfort Control² System™*, refer to Section 5.15 for adjusting airflows.

NOTE: Airflow adjustment is active for cooling and heat pump operation only. They are ignored when electric heat is activated.

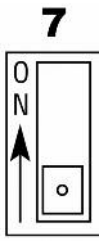
5.16 ELECTRIC HEAT AIRFLOW

The RHPL-series of air handlers are factory programmed to provide adequate airflow for electric heat (auxiliary heat). Airflow for electric heat is fixed and cannot be field adjusted.

Thermostat Input	Electric Heat Airflow			
	2-ton	3-ton	4-ton	5-ton
W1 or W2	800 CFM	1200 CFM	1600 CFM	1800 CFM

5.17 COOLING MODE DEHUMIDIFICATION

FIGURE 17
ON DEMAND DEHUMIDIFICATION DIP SWITCH



The RHPL-series air handler is shipped with “On Demand Dehumidification” (ODD) turned OFF. On Demand Dehumidification is used in conjunction with a traditional 24VAC thermostat equipped with an on-board humidity sensor. Activate ODD by turning DIP switch 7 ON. ODD operation is controlled by the indoor humidity sensed at the thermostat. Operation is:

Normal Humidity (humidity BELOW the thermostat set point):

Normal Humidity	Result
A 24VAC signal is applied to the ODD terminal	Full rated airflow is delivered by the blower

High Humidity (humidity ABOVE the thermostat set point):

High Humidity	Result
No signal applied to the ODD terminal	Airflow is reduced by a preset amount to increase latent capacity

The RHPL air handler is programmed to provide maximum efficiency and optimum humidity removal. When high humidity is detected, the air handler reduces cooling airflow defined in Table 9.

TABLE 9
ODD AIRFLOW REDUCTION

Air Handler	Cooling Airflow Reduction
2-ton	85%
3-ton	80%
4-ton	
5-ton	

IMPORTANT: The DIP switches are active only when using conventional a 24VAC thermostat. If using the *Comfort Control² System™*, refer to Section 5.17 for adjusting airflows. (Refer to Section 5.9.)

NOTE: ODD airflow adjustments are active for cooling operation only. They are ignored when the heat pump is in heating mode or when electric heat is activated.

TABLE 10
SELECTION C EXPLANATION: ON DEMAND DEHUMIDIFICATION

SWITCH 7 POSITION	ODD INPUT	COOLING AIRFLOW - CFM							
		2-TON		3-TON		4-TON		5-TON	
		Y1	Y2	Y1	Y2	Y1	Y2	Y1	Y2
ON	NONE	500	625	725	950	950	1300	1100	1350
	24VAC	625	775	900	1200	1200	1625	1375	1675

5.18 COOLING DELAY PROFILES

Cooling delay profiles are not available when the RHPL air handler is controlled using a conventional 24VAC thermostat. These profiles are available only when the air handler is wired for the *Comfort Control² System™*. Refer to Section 5.10 for *Comfort Control²* Cooling Delay Profiles wiring.

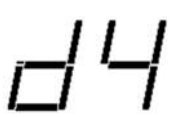
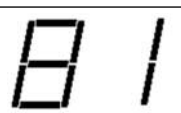
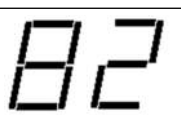
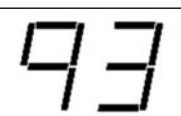
5.19 AIR HANDLER DIAGNOSTIC CODES

Descriptions of the air handler *Comfort Control²* diagnostic codes are provided below. These codes can be displayed at the thermostat or via a diagnostic tool.

IMPORTANT: Air handler diagnostic codes are available at the thermostat when the system is wired for *Comfort Control²*.

AIR HANDLER DIAGNOSTIC CODES

Descriptions of the ICC diagnostic codes are provided below:

7-Segment LEDs Display Code	Diagnostic Description	Status/Possible Cause – Troubleshooting Information
	d1 – No Shared Data The control board does not have shared data.	• Replace memory card with correct system information
	d3 – Airflow CFM Mismatch The air handler cannot supply the required airflow for proper system operation	• Misapplied/wrong indoor air mover – replace with properly sized air handler/furnace.
	d4 – (Device) Memory Card Invalid for Device The memory card is missing or the data in the memory card does not match the data in the control.	• Check memory card to ensure it matches device • Check if memory card is present
	d5 – Card Hardware Conflict The motor horsepower is not correct for the air handler	• Replace the air handler motor with the correct horsepower motor. • Replace the memory card with correct system information.
	d6 – BLWR HP CNFLCT Blower Horsepower conflict The horsepower data in the memory card does not match the motor horsepower.	• Replace the motor with correct horsepower motor. • Replace the memory card with correct system information. Check memory card to ensure it matches device
	d7 – BLWER MFG CNFLCT The System does not have any data on the installed motor.	• Replace the memory card with correct system information.
	d8 – Old Shared Data System data is obsolete	• If system will not operate, order new memory card to update system information.
	60 – BLWR FLT–RUN The ECM motor is running but has a fault	• TEST the ECM for proper operation.
	61 – BLWR FLT–NO RUN The ECM motor is not operating	• Make sure the ECM motor wiring harness is plugged into the ECM motor and control board. • Test the ECM motor for proper operation.
	68 – ECM No Signal The ECM motor is not communicating to the air handler control board.	• Make sure the ECM motor wiring harness is plugged into the ECM motor and control board. • Test the ECM motor for proper operation using a service tool.
	81 – Return Air Sensor Out of Range The resistance of the sensor out of range for normal operation.	• Make sure the sensor is plugged into the air handler control board. • Check the resistance of the sensor. Replace if it is out of tolerance.
	82 – Supply Air Sensor Out of Range The resistance of the sensor out of range for normal operation.	• Make sure the sensor is plugged into the air handler control board. • Check the resistance of the sensor. Replace if it is out of tolerance.
	93 – Internal Control Fault The air handler control is not functioning.	• Check control for proper system operation. • Replace control